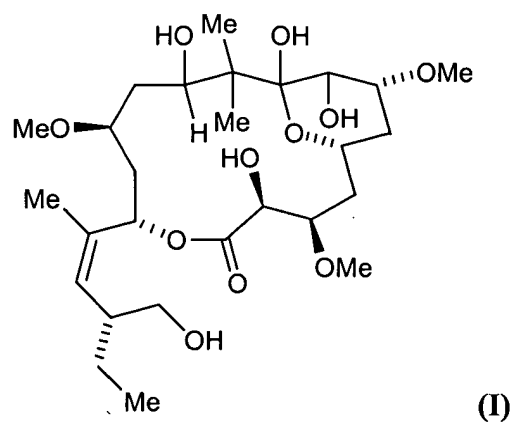


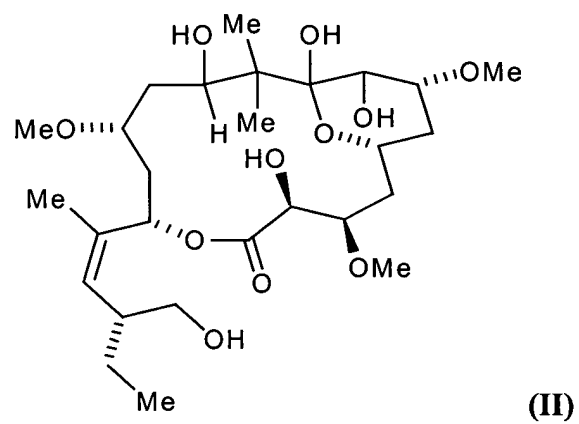
CLAIMS

What is claimed:

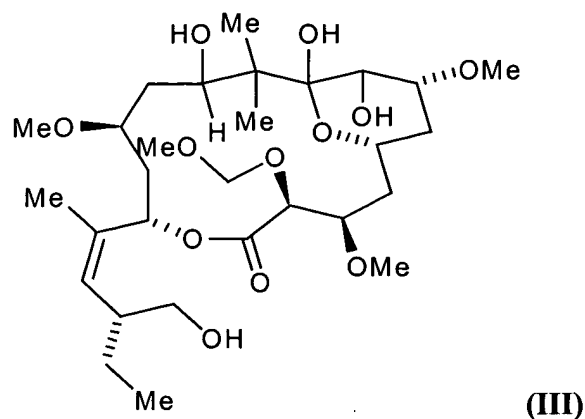
1. A synthetic compound of formula:



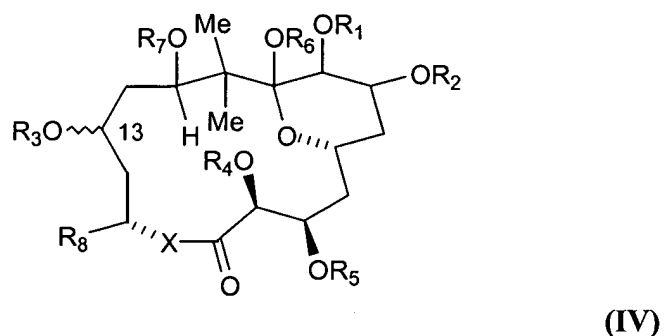
2. A synthetic compound of formula:



3. A compound of formula:

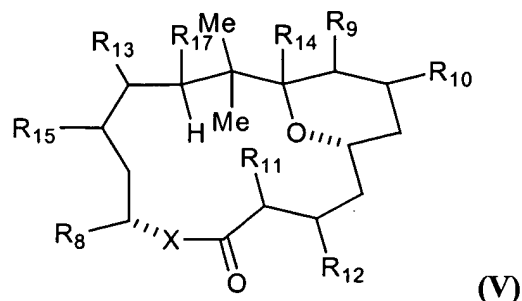


4. A compound of formula:



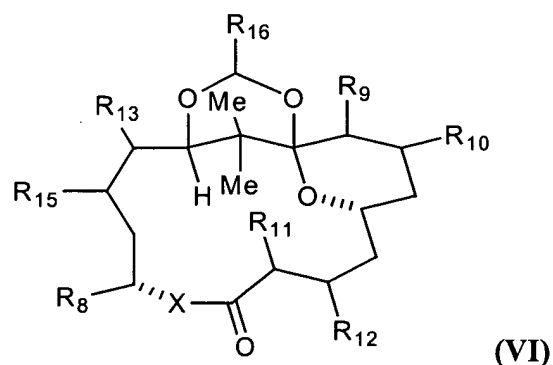
where R_1 , R_2 , R_3 , R_4 , R_5 and R_6 can be the same or different and are selected from the group consisting of H, Me, alkyl, and functionalized alkyl, and where R_8 is selected from the group consisting of H, aryl, heteroaryl, alkyl, functionalized alkyl, alkenyl, functionalized alkenyl, alkynyl, and functionalized alkynyl, wherein the functional group is a heteroatom, a halide, an aryl, or a heteroaryl.

5. A compound of formula:



where R_{13} is H or Me, where R_{14} , R_{17} can be the same or different and are selected from the group consisting of H, OH, and OR, where R_9 , R_{10} , R_{11} , R_{15} can be the same or different and are selected from the group consisting of H, Me, and OR, where R and R_5 can be the same or different and are selected from the group consisting of H, Me, alkyl, and functionalized alkyl, where R_8 is selected from the group consisting of H, aryl, heteroaryl, alkyl, functionalized alkyl, alkenyl, functionalized alkenyl, alkynyl, and functionalized alkynyl, where X is O or NH, and wherein the functional group is a heteroatom, a halide, an aryl, or a heteroaryl.

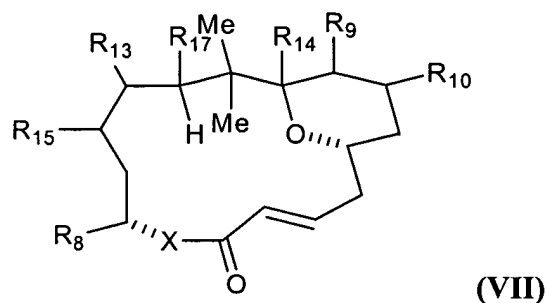
6. A composition comprising a compound of formula:



where R_{13} is H or Me, where R_9 , R_{10} , R_{11} , R_{15} can be the same or different and are selected from the group consisting of H, Me, and OR, where R and R_5 can be the same or different and are selected from the group consisting of H, Me, alkyl, and functionalized alkyl, where R_8 , R_{16} can

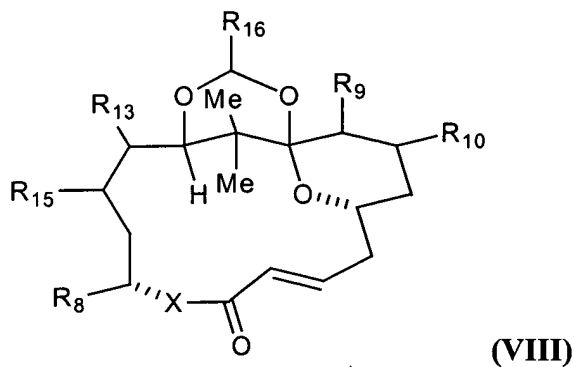
be the same or different and is selected from the group consisting of H, aryl, heteroaryl, alkyl, functionalized alkyl, alkenyl, functionalized alkenyl, alkynyl, and functionalized alkynyl, where X is O or NH, and wherein the functional group is a heteroatom, a halide, an aryl, or a heteroaryl.

7. A composition comprising a compound of formula:



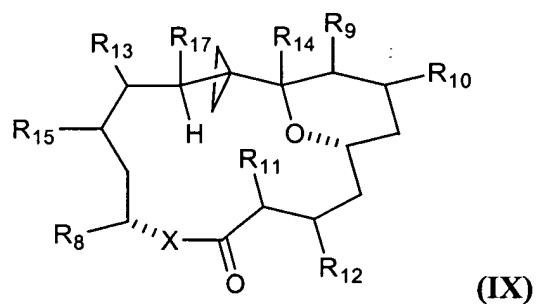
where R₁₃ is H or Me, where R₁₄, R₁₇ can be the same or different and is selected from the group consisting of H, OH, and OR, where R₉, R₁₀, R₁₅ can be the same or different and is selected from the group consisting of H, Me, OR, where R is selected from the group consisting of H, Me, alkyl, and functionalized alkyl, where R₈ is selected from the group consisting of H, aryl, heteroaryl, alkyl, functionalized alkyl, alkenyl, functionalized alkenyl, alkynyl, and functionalized alkynyl, where X is O or NH, and wherein the functional group is a heteroatom, a halide, an aryl, or a heteroaryl.

8. A composition comprising a compound of formula:



where R_{13} is H or Me, where R_9 , R_{10} , R_{15} can be the same or different and are selected from the group consisting of H, Me, and OR, where R is selected from the group consisting of H, Me, alkyl, and functionalized alkyl, where R_8 , R_{16} can be the same or different and are selected from the group consisting of H, aryl, heteroaryl, alkyl, functionalized alkyl, alkenyl, functionalized alkenyl, alkynyl, and functionalized alkynyl, where X is O or NH, and wherein the functional group is a heteroatom, a halide, an aryl, or a heteroaryl.

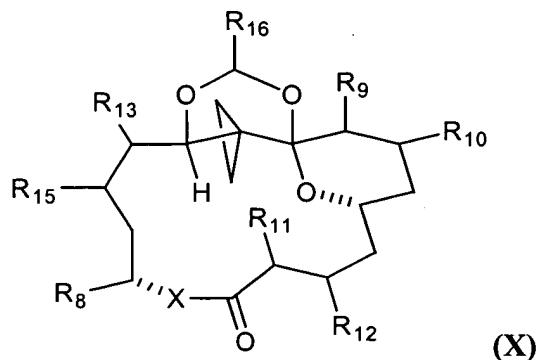
9. A composition comprising a compound of formula:



where R_{13} is H or Me, where R_{14} , R_{17} can be the same or different and are selected from the group consisting of H, OH, and OR, where R_9 , R_{10} , R_{11} , R_{15} can be the same or different and are selected from the group consisting of H, Me, and OR, where R and R_5 can be the same or different and are selected from the group consisting of H, Me, alkyl, and functionalized alkyl, where R_8 is selected from the group consisting of H, aryl, heteroaryl, alkyl, functionalized alkyl,

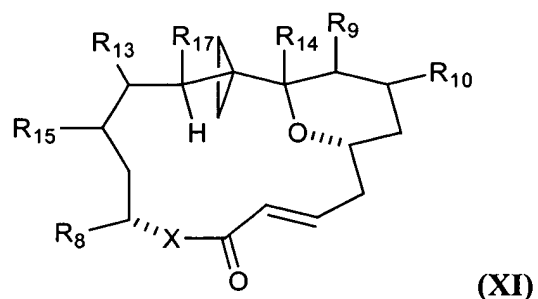
alkenyl, functionalized alkenyl, alkynyl, and functionalized alkynyl, where X is O or NH, and wherein the functional group is a heteroatom, a halide, an aryl, or a heteroaryl.

10. A composition comprising a compound of formula:



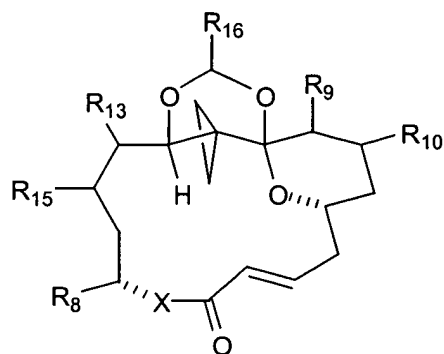
where R₁₃ is H or Me, where R₉, R₁₀, R₁₁, R₁₅ can be the same or different and are selected from the group consisting of H, Me, and OR, where R and R₅ can be the same or different and are selected from the group consisting of H, Me, alkyl, and functionalized alkyl, where R₈, R₁₆ can be the same or different and are selected from the group consisting of H, aryl, heteroaryl, alkyl, functionalized alkyl, alkenyl, functionalized alkenyl, alkynyl, and functionalized alkynyl, where X is O or NH, and wherein the functional group is a heteroatom, a halide, an aryl, or a heteroaryl.

11. A composition comprising a compound of formula:



where R_{13} is H or Me, where R_{14} , R_{17} can be the same or different and are selected from the group consisting of H, OH, and OR, where R_9 , R_{10} , R_{15} can be the same or different and are selected from the group consisting of H, Me, OR, where R includes H, Me, alkyl, and functionalized alkyl, where R_8 is selected from the group consisting of H, aryl, heteroaryl, alkyl, functionalized alkyl, alkenyl, functionalized alkenyl, alkynyl, and functionalized alkynyl, where X is O or NH, and wherein the functional group is a heteroatom, a halide, an aryl, or a heteroaryl.

12. A composition comprising a compound of formula:

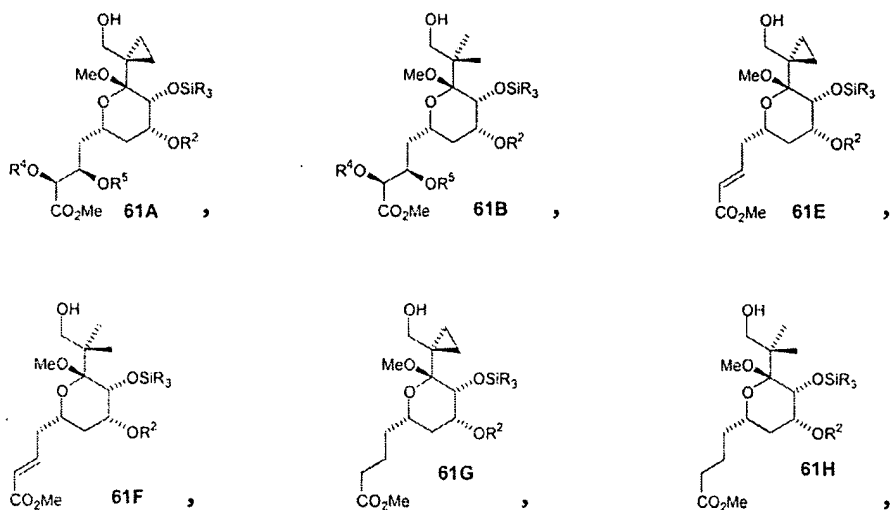


(XII)

where R_{13} is H or Me, where R_9 , R_{10} , R_{15} can be the same or different and are selected from the group consisting of H, Me, and OR, where R is selected from the group consisting of H, Me, alkyl, and functionalized alkyl, where R_8 , R_{16} can be the same or different and are selected from the group consisting of H, aryl, heteroaryl, alkyl, functionalized alkyl, alkenyl, functionalized alkenyl, alkynyl, and functionalized alkynyl, where X is O or NH, and wherein the functional group is a heteroatom, a halide, an aryl, or a heteroaryl.

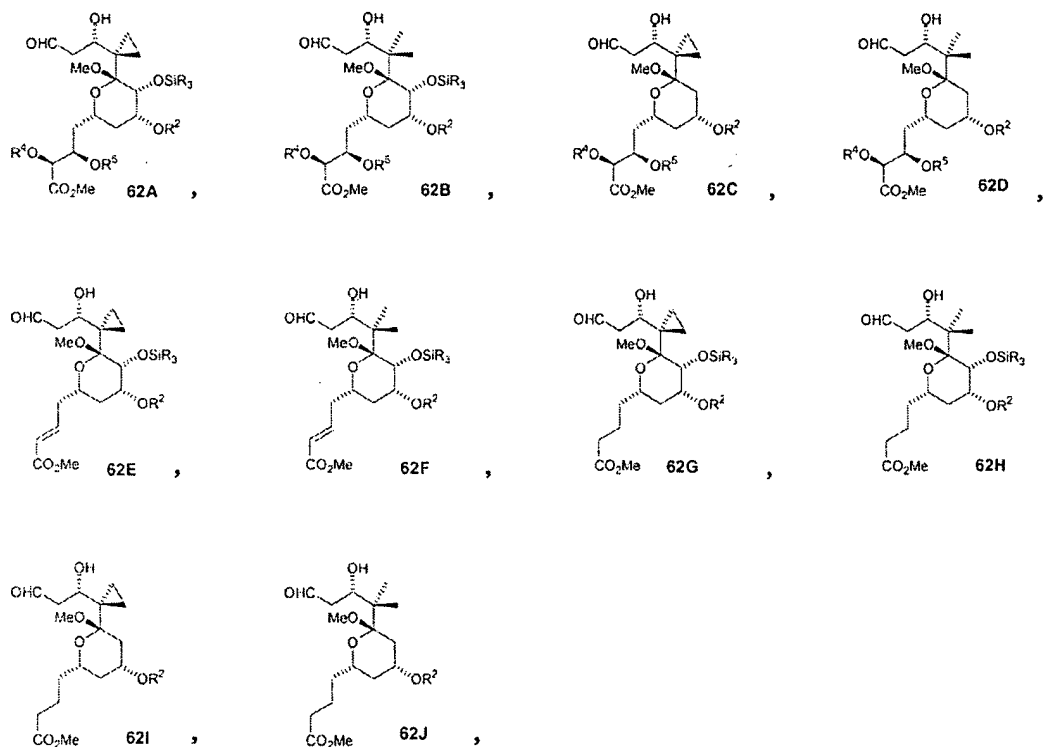
13. A synthetic compound having the ^{13}C NMR signature of FIG. 4 and the ^1H NMR signature of Fig. 5, wherein the compound is dextrarotary, and wherein the compound comprises microtubule-stabilizing activity.
14. A method for treating cancer comprising contacting a tumor cell within a subject with a compound of any one of claims 1 through 13 for a period of time and in an amount sufficient to inhibit growth of the tumor cell.
15. A method of suppressing growth of a tumor cell comprising contacting said cell with a compound of any one of claims 1 through 13 for a period of time and in an amount sufficient to suppress growth of the tumor cell.
16. A method of inhibiting cell proliferation comprising contacting the proliferating cells with a compound of any one of claims 1 through 13 for a period of time and in an amount sufficient to inhibit proliferation of the cells.
17. A method of stabilizing microtubule formation in a cell comprising administering to the cell the compound of any one of claims 1 through 13 for a period of time and in an amount sufficient to stabilize microtubule formation.
18. A method of producing macrolactone comprising:
- a) synthesizing a pyran containing a first substituent having a carboxylic acid group and a second substituent having a hydroxyl group; and
 - b) reacting the carboxylic acid group with the hydroxyl group to form a macrolactone.

19. A compound selected from the group consisting of:



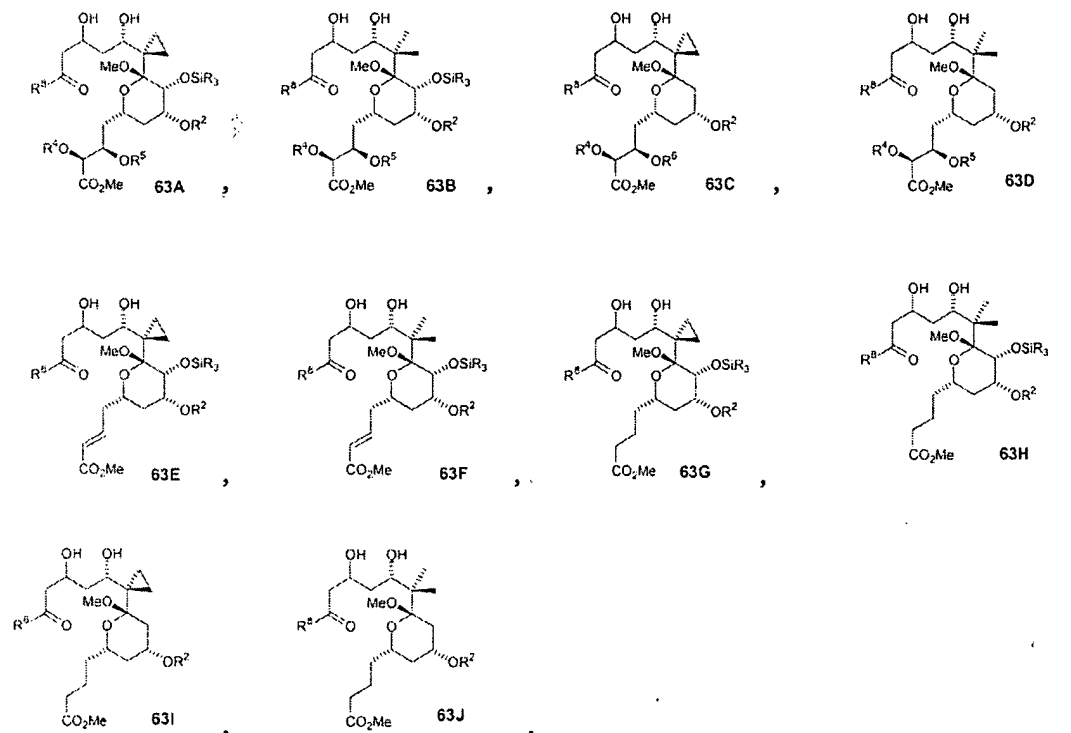
wherein R^2 , R^4 and R^5 is the same or different and are selected from the group consisting of alkyl, and functionalized alkyl, wherein the functional group is a heteroatom, a halide, an aryl, or a heteroaryl.

20. A compound selected from the group consisting of:



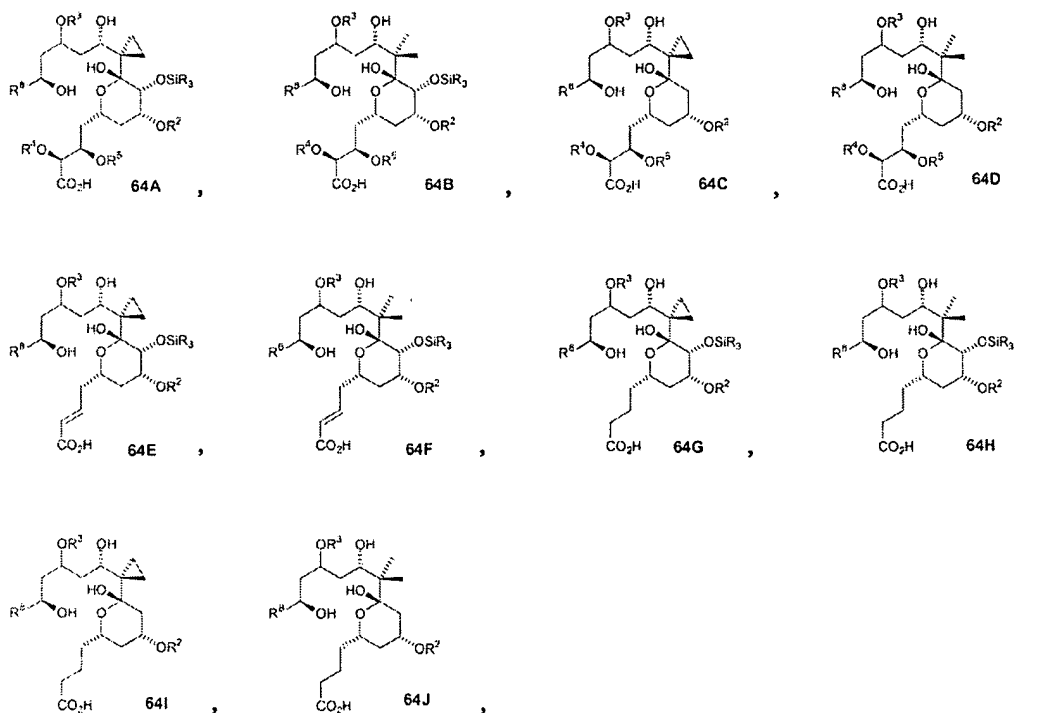
wherein R^2 , R^4 and R^5 is the same or different and are selected from the group consisting of alkyl, and functionalized alkyl, wherein the functional group is a heteroatom, a halide, an aryl, or a heteroaryl.

21. A compound of selected from the group consisting of:



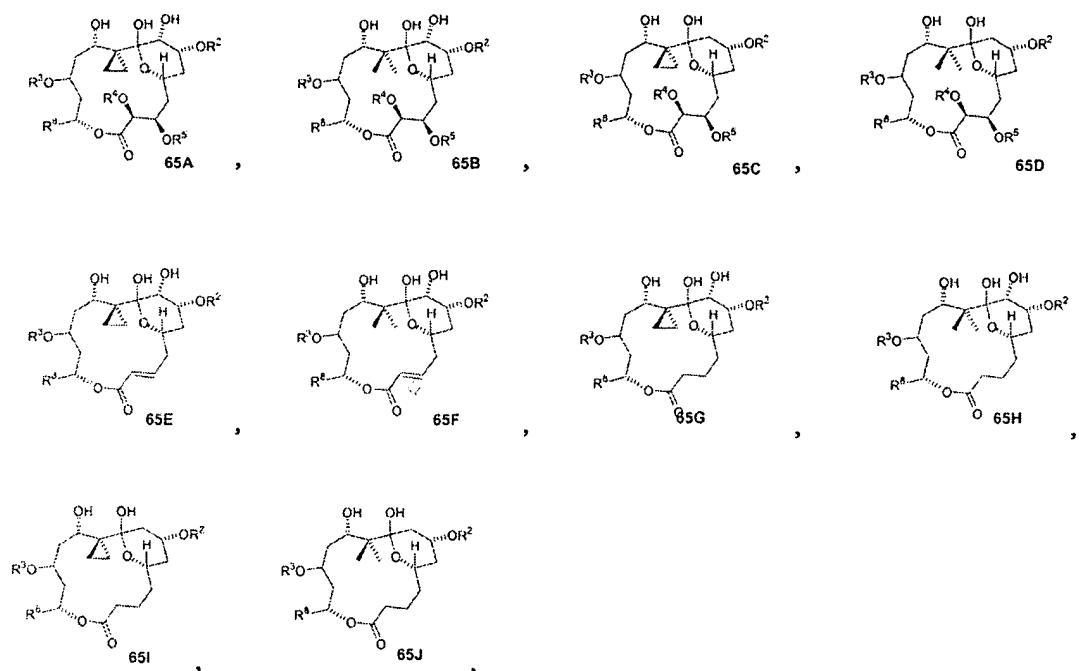
wherein R^2 , R^4 and R^5 can be the same or different and are selected from the group consisting of alkyl and functionalized alkyl, and where R^8 is selected from the group consisting of aryl, heteroaryl, alkyl, functionalized alkyl, alkenyl, functionalized alkenyl, alkynyl, and functionalized alkynyl, wherein the functional group is a heteroatom, a halide, an aryl, or a heteroaryl.

22. A compound of selected from the group consisting of:



wherein R^2 , R^3 , R^4 , R^5 can be the same or different and are selected from the group consisting of alkyl, and functionalized alkyl, and where R^8 is selected from the group consisting of aryl, heteroaryl, alkyl, functionalized alkyl, alkenyl, functionalized alkenyl, alkynyl, and functionalized alkynyl, wherein the functional group is a heteroatom, a halide, an aryl, or a heteroaryl.

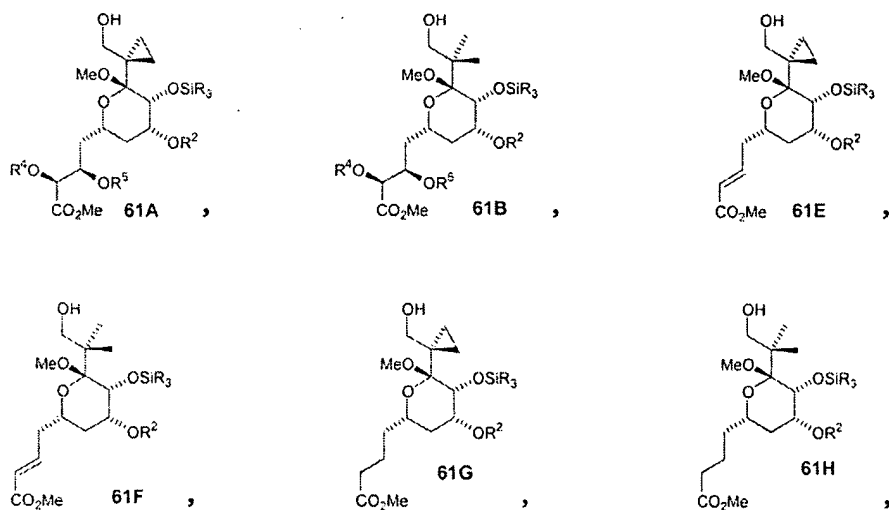
23. A compound selected from the group consisting of:



wherein R², R³, R⁴, R⁵ can be the same or different and are selected from the group consisting of alkyl, and functionalized alkyl, and where R⁸ is selected from the group consisting of aryl, heteroaryl, alkyl, functionalized alkyl, alkenyl, functionalized alkenyl, alkynyl, and functionalized alkynyl, wherein the functional group is a heteroatom, a halide, an aryl, or a heteroaryl.

24. A method for producing Peloruside A comprising:

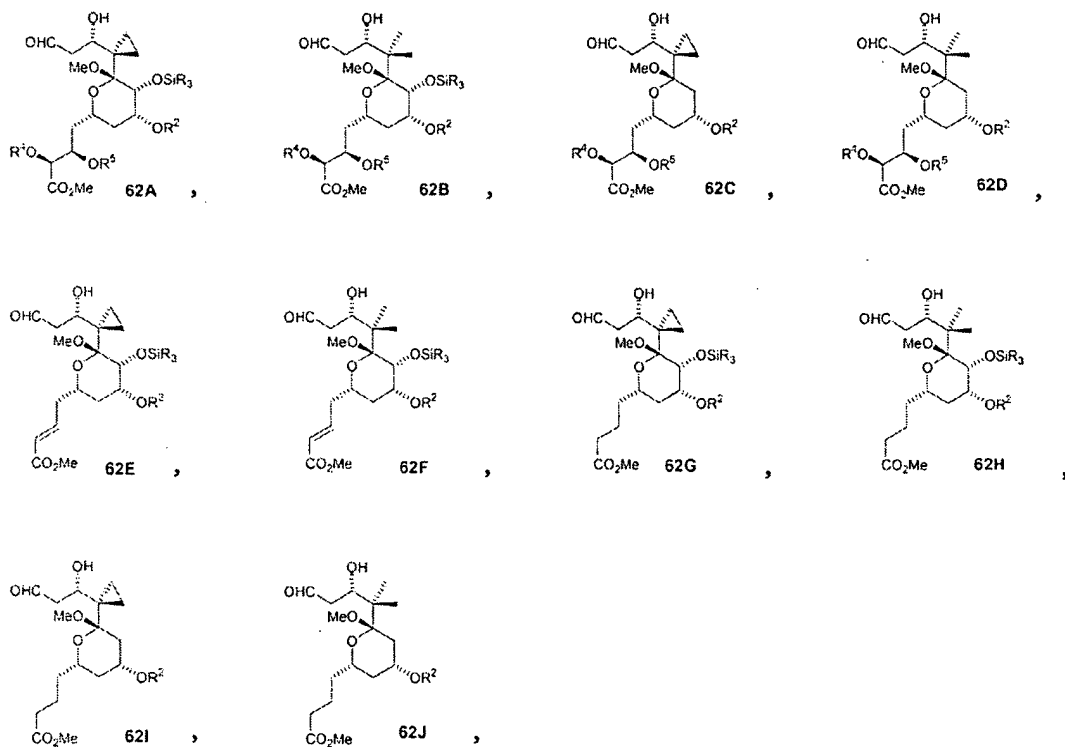
a) oxidizing an alcohol function in a compound selected from the group consisting of:



wherein R^2 , R^4 and R^5 are the same or different and are selected from the group consisting of alkyl, and functionalized alkyl, wherein the functional group is a heteroatom, a halide, an aryl, or a heteroaryl, to obtain a compound having an aldehyde function;

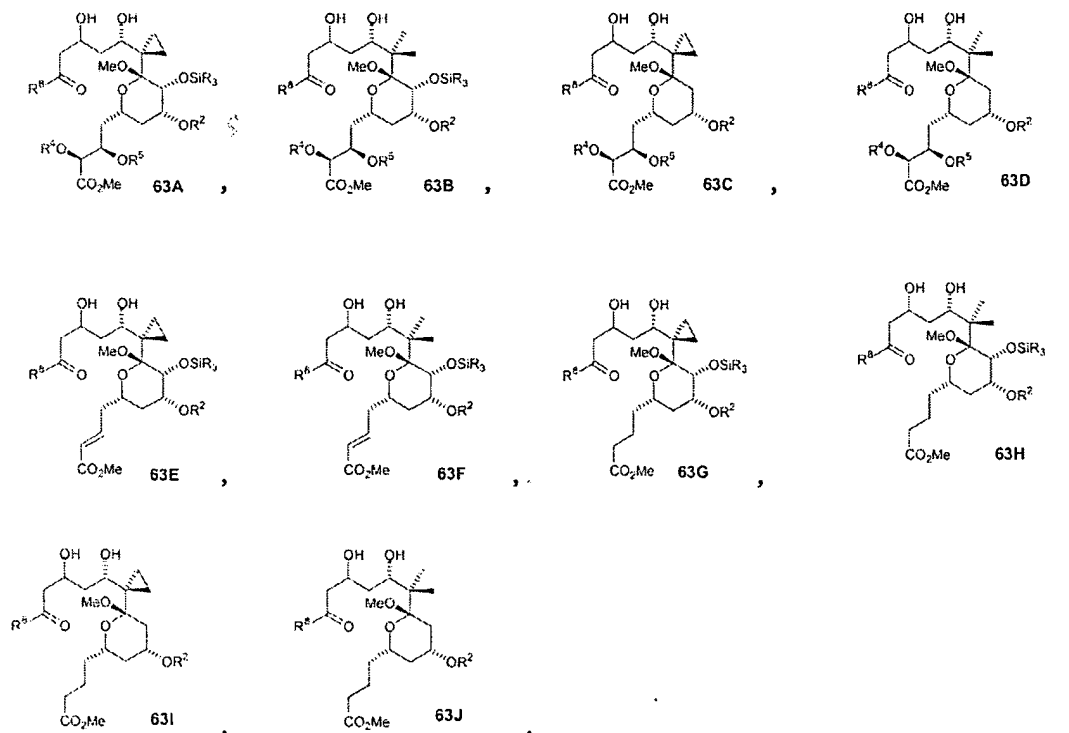
(b) reacting the compound obtained in (a) with an allylating agent;

(c) subjecting the reaction product of (b) to oxidative cleavage of the aldehyde to obtain a compound selected from the group consisting of:



wherein R^2 , R^4 and R^5 are the same or different and are selected from the group consisting of alkyl, and functionalized alkyl, wherein the functional group is a heteroatom, a halide, an aryl, or a heteroaryl;

(d) reacting the compound obtained in (c) with an enolate derived from a methyl or ethyl ketone to obtain a compound selected from the group consisting of:



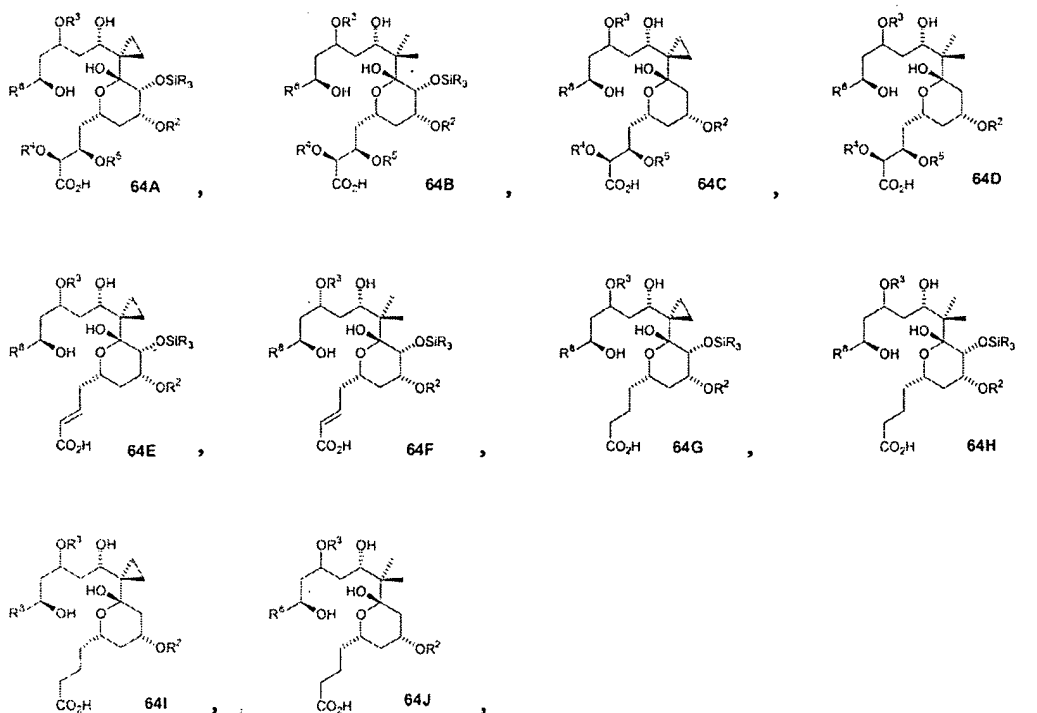
wherein R², R⁴ and R⁵ can be the same or different and are selected from the group consisting of alkyl and functionalized alkyl, and where R⁸ is selected from the group consisting of aryl, heteroaryl, alkyl, functionalized alkyl, alkenyl, functionalized alkenyl, alkynyl, and functionalized alkynyl, wherein the functional group is a heteroatom, a halide, an aryl, or a heteroaryl;

(e) reacting the compound obtained in (d) with an alkylating agent to introduce an R³ group;

(f) subjecting the compound obtained in (e) with a reducing agent to reduce a ketone group in the compound obtained in (e) to an alcohol;

(g) converting the alcohol group of the compound obtained in (f) to an ester group;

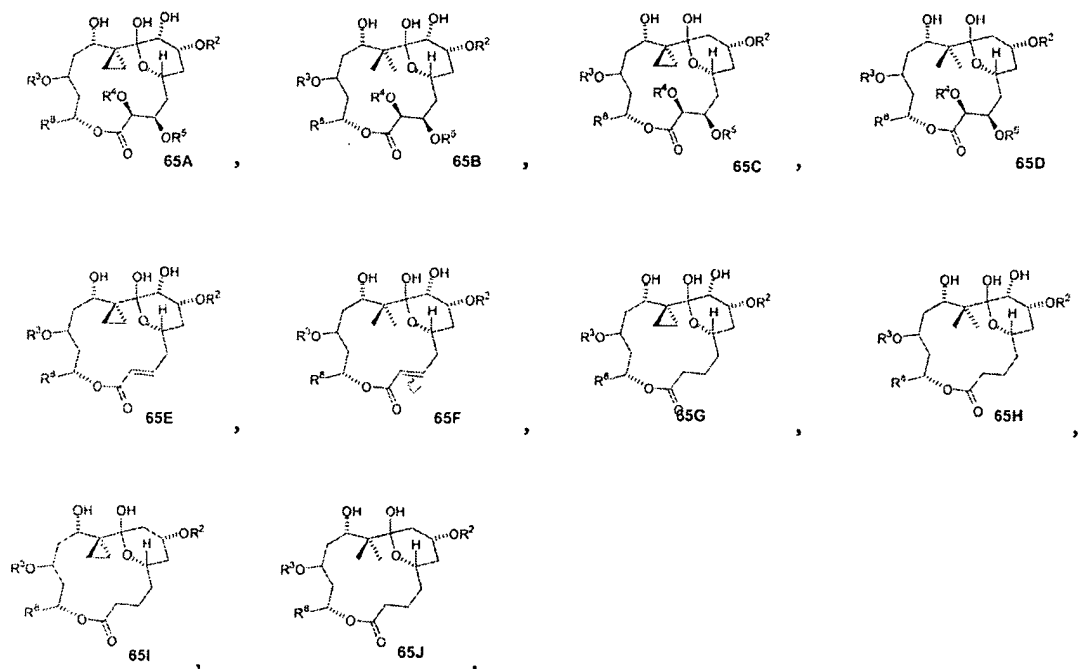
(h) subjecting the compound obtained in (g) to an agent that hydrolyzes the ester group of the compound produced in (f) to a carboxylic acid group to obtain a seco-acid compound selected from the group consisting of:



wherein R^2 , R^3 , R^4 , R^5 can be the same or different and are selected from the group consisting of alkyl, and functionalized alkyl, and where R^8 is selected from the group consisting of aryl, heteroaryl, alkyl, functionalized alkyl, alkenyl, functionalized alkenyl, alkynyl, and

functionalized alkynyl, wherein the functional group is a heteroatom, a halide, an aryl, or a heteroaryl; and

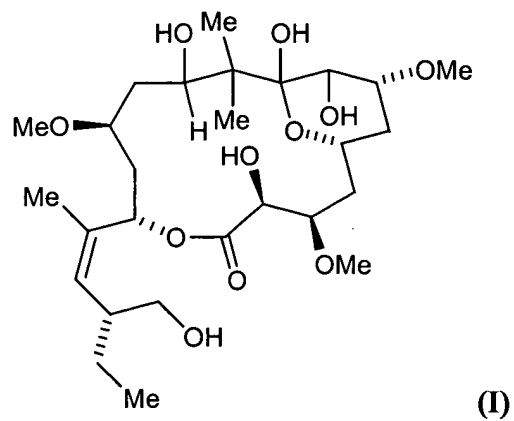
(i) reacting the carboxylic acid group and a hydroxyl group of the compound produced in (h) to obtain a macrolactone selected from the group consisting of:



wherein R^2 , R^3 , R^4 , R^5 can be the same or different and are selected from the group consisting of alkyl, and functionalized alkyl, and where R^8 is selected from the group consisting of aryl, heteroaryl, alkyl, functionalized alkyl, alkenyl, functionalized alkenyl, alkynyl, and functionalized alkynyl, wherein the functional group is a heteroatom, a halide, an aryl, or a heteroaryl.

25. The method of claim 24 wherein the macrolactone is Peloruside A.

26. The method of claim 24 wherein the macrolactone has the formula:



27. The method of claim 24 wherein the macrolactone has the formula:

